



Web Development Policy & Standards

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Web Development Policy & Standards

I. Introduction

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The National Science Foundation (NSF) web site has become a primary interface for the agency with scientists, engineers, university administrators, educators, business, vendors, the media, policy makers, and the interested general public.

The NSF web site is a collaborative effort by the many Directorates and Offices of NSF. Content for the NSF web site is provided by the organizations that have traditionally provided the content via the printed page.

This authoring guide addresses policy, procedures, best practices & technical requirements, and resources to be used when developing and maintaining an NSF web site. This guide includes:

II. Policy

A statement of the policy governing development and management of NSF web sites. This includes authorship and webmaster responsibilities.

1. Authorship
 - A. Author Responsibility
 - B. Webmaster Responsibility
2. Content
3. Infrastructure

III. Procedures

Current procedures for planning/developing, testing/posting, and running/maintaining NSF web sites.

1. Planning/Developing a Site
2. Web Database Applications
3. Testing/Posting a Site
 - A. Security
 - B. Quality Assurance
4. Running/Maintaining a Site

IV. Best Practices and Technical Requirements

Addresses questions in structuring content for a hypertext environment and essential elements of designing pages for NSF web sites, including accessibility

considerations.

Discusses navigation tools, interactivity, and user considerations as well as typography, graphics, and document types.

1. Required Practices
 - A. [Web](#)
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The growth in web use underscores the need for policies and procedures to help people both inside and outside NSF to locate, retrieve, and use the information they are seeking. This is especially important at NSF because web design and maintenance is so decentralized. Adherence to consistent web policies and procedures will allow customers to enter NSF's web site(s) at any point with minimal confusion. In turn, these policies and procedures fit into a broader set of Federal guidelines, ensuring that NSF's site is in compliance with Federal laws and regulations.

Additional benefits to the Foundation are:

- Availability of current and complete information.
- Reduced inventory of paper documents, thereby reducing costs of printing and distribution.
- Information exchange and collaboration between employees and customers.
- A reduced number of paper forms and repetitive keying of information, through the use of interactive online forms linked to active databases.
- Improved customer service.

Use of the web for business purposes is subject to the same management controls as any other platform. Authors and Coordinating Webmasters are responsible for understanding the impact and applicability of policies and standards for their activities.

The following information describes specific policies for authorship, content, and infrastructure of NSF web sites.



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III.1. Authorship

Assistant Directors or Office Heads of the various NSF organizations are responsible for establishing a system to review and approve all directorate-specific or office-specific information posted on NSF web sites, whether the sites are centrally maintained or maintained by the directorates or offices. Each review system should ensure that materials subject to clearance are appropriately cleared and all information posted on external and internal web sites is reviewed by someone other than the author. Review systems should be monitored by the AD or Office Head to guarantee their effectiveness.

A. Author Responsibility

1. Ensure appropriate document clearance.

The Office of Budget, Finance and Award Management (BFA) is responsible for managing the NSF clearance process, which includes final approval of NSF print and electronic documents. The same clearance procedures that apply to printed documents at NSF apply to documents that are posted on the external web site.

Requests for preliminary approval, the first step in the clearance process, must be submitted to BFA clearance (bfa-clear@nsf.gov) and a copy should also be sent to your [Directorate Clearance Liaison](#). BFA has instituted an electronic tracking and monitoring system as well as an electronic system of notifications to all NSF offices involved with clearance. Currently, Jean Feldman is serving as NSF clearance officer, and Sharon Graham coordinates the day-to-day technical reviews for the Division of Grants and Agreements.

More details about the process and types of documents can be found at the [NSF Clearance Process](#) (staff memorandum iod0015), the [Proposal and Award Manual](#) (PAM) and at [Administrative Information Manual, Chapter II, Subchapter 200](#), (currently being revised). Should the author have additional questions about the clearance portion of the process, the author should check with their Directorate Clearance Liaison.

Publications that require BFA clearance may include, but are not limited to:

- program announcements and solicitations, announcements of deadlines and target dates for proposals, proposal submission guidelines, new programs and initiatives (see [PAM](#));
- "Dear Colleague" letters used to announce deadlines and target dates for proposals, proposal submission guidelines, new programs, initiatives, and changes to existing programs;
- documents containing program descriptions, program budgets, strategic plans, NSF policy statements, or changes to standard NSF policies, practices, or procedures;
- Frequently Asked Questions (FAQs) that relate to documents containing program or policy information, particularly if the FAQs provide additional guidance and/or interpretation of an "official document;"
- substantive changes to previously cleared items:
 - deadlines, including additional deadlines for future years;
 - eligibility standards and/or cost sharing requirements;
 - review criteria;
 - submission guidelines; and
 - additional substantive questions-and-answers for FAQs;
- newsletters, journals, brochures, catalogs;
- proceedings from workshops; and
- reports mandated by Congress.

If in doubt, please check with your Directorate Clearance Liaison.

Committee and workshop reports that are not official NSF publications but are posted on the NSF website should contain the following disclaimer:

"Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation"

2. Ensure that all official NSF publications (particularly those with an NSF or NSB number) appear in the [Online Document System \(ODS\)](#). Adding your document to the ODS will ensure notification through a Custom News Service alert.

Note: Official NSF proposal-generating publications should appear only in the ODS. Directorates should hyperlink any reference to such documents directly to their location in the ODS.

3. Assure that Directorate web pages that reference deadline dates for program announcements, solicitations and program descriptions, including multi-year deadline dates are consistent with official cleared publications under #2 above.
4. Ensure section [II.2. Content](#) is adhered to.
5. Ensure written permission is granted before posting copyright-protected information (photographs, images, and documents) to NSF web sites.

B. Webmaster Responsibility

The Coordinating Webmaster for each directorate will be responsible for maintaining the directorate's content.

Content/Maintenance responsibilities

- Fix broken links in a timely manner.
- Remove obsolete files.
- Respond to user inquiries.
- Ensure all files sent to the Webteam are free of viruses.
- Ensure content meets policy guidelines (see section [II.2. Content](#)).
- Ensure content is current.
- Remove obsolete content.
- Modify content as needed to meet NSF required practices (see section [IV. Best Practices & Technical Requirements](#)).
- Ensure the quality of hyperlinks to sites outside of NSF.

Basic responsibilities

- Develop/format/publish content in the appropriate area.
- Understand and adhere to policies, procedures, and best practices and technical requirements in this Manual.
- Maintain liaison with the NSF Webteam.
- Be familiar with basic HTML coding and web page development.

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II. Policy

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All NSF web content is to be developed for the purpose of promoting and supporting NSF's mission.

The NSF Webteam will coordinate activities with the Directorate Coordinating Webmasters to minimize duplication of effort. All content for the NSF web site should adhere to the guidelines as outlined in section [IV. Best Practices & Technical Requirements](#).

Information that is deemed confidential under the Privacy Act or protected from disclosure by the [Freedom of Information Act](#) (FOIA) should never be posted on the Web.

NSF's web site must be accessible to all, including those with disabilities and those without reasonable access to advanced technologies. Web sites must be accessible and usable by non-graphical browsers (see Best Practices & Technical Requirements section [IV.2.B. Required Practices - Web Accessibility](#) for detailed requirements).

Restricted and Protected Content

1. Restricted Content

- a. includes copyrighted information that NSF does not have permission to republish. (Care must be taken to avoid copyright violations. Printed materials, photographs, and images are copyright-protected unless created by NSF or other Federal agencies.)
- b. sensitive information and information identified in NSF's security policies

2. Protected Content

- a. Personal information about individuals (other than workplace contact information) or information from specific proposal jackets must never be posted.
- b. Other examples of protected information may include, but are not

limited to:

- panel memberships when that information could be related to specific proposals;
- pre-award proposal status (outside of FastLane);
- declinations;
- NSF budget information prior to official release;
- information collection, release and dissemination; and
- draft documents.

For more information, contact the FOIA Officer and/or the Office of the General Counsel (OGC).

Data Quality

All posted information must be current and correct. In addition, some information may be required to meet the data quality standards outlined in [NSF's Information Quality Guidelines](#). Presentation of all information must avoid errors that could compromise meaning (e.g., missing text, misaligned table cells, etc.).

User Home Pages

User home pages can be useful for those who deal directly with a specific user community, the public, or those who hold high-profile positions. However, user home pages cannot be and should not be viewed as "personal" home pages. Content and links should be relevant to NSF and should relate to the employee's role as he or she supports NSF's mission. Assistant Directors and Office Directors are responsible for making sure the content of these pages and related documents is appropriate.

External Links

External links can add significant value to the NSF web site. However, all non-government, non-academic links should be added with caution. It is important to avoid giving a user the impression that NSF is endorsing a commercial product. It is also important to link only to sites directly and immediately related to NSF's mission. Careful review prior to establishing the links should be conducted, and these links should be reviewed periodically.

Look and Feel

NSF's web site should offer a consistent and/or complementary "look and feel" and should provide full access to the entire collection of information, regardless of the point at which a user enters the system. Because NSF's web site is decentralized and includes multiple servers, it is important that NSF webmasters work to knit together the disparate resources through similar or complementary styles, buttons, user interfaces, tools for the user, etc.

Central Resources

Office and directorate-level home pages should be designed to:

- link to the main home page;
- accommodate cross-links among programs, projects, and individuals;
- provide a link to the Online Document System ([ODS](#));
- avoid redundant and/or inconsistent presentation of information in various areas of NSF webspace; and
- provide a link to the central server site search and staff directory.

Contact

Every home page or grouping of related pages should list an email address or include a link to an email form that can be used to contact a responsible party regarding the content of the page (see Best Practices & Technical Requirements section [IV.1.A. Required Practices - Web](#)).

Browsers

All content must be viewable via Netscape 4.0 and up and Internet Explorer 4.0 and up, and must degrade gracefully to older and text only browsers.

Privacy

Pages collecting personal data (through a form, or by requesting email feedback) must state how it will be used and link to the [NSF Privacy Policy](#)

Cookies

NSF uses "cookies" for two purposes: (1) To allow site visitors, at their option, to customize the appearance, content, and/or behavior of certain web pages, and (2) to maintain session variables in web applications so that the server can "remember" selections visitors have made in an HTML form on a previous page. There is no intent on the part of NSF to use cookies to track the activities of web users or collect data on users without their knowledge. In all cases, NSF web sites are prohibited from setting "cookies" without clearly notifying site visitors and asking permission.

"Cookies", in the case of user customization, that are set on a visitor's system should contain no personal information about the visitor and will not be read by servers other than www.nsf.gov. NSF will not retain any information about the customization options users select. Session variables are to be used only for the duration of the individual session and only for navigation within a specific application. No personally identifiable information should be collected, and no information should be retained by NSF after the user's session is complete. No "persistent" cookie may be implemented on an NSF web site without explicit

approval by the agency Director.

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The NSF Webteam

- Responsible for creating WinSCP and Webstage Manager accounts for webmasters and web developers.
- Coordinates application development and database requests.
- Uploads files to the internal and external NSF web servers when requested.
- Coordinates NSF web management across the agency through directorate-level Coordinating Webmasters.
- Each directorate has a Coordinating Webmaster who is responsible for sending information to the NSF Webteam. A complete list of Coordinating Webmasters can be found at <http://www.inside.nsf.gov/webdev/cweb/cweblist.htm>.
- After necessary approval and review (see section [II.1.A. Author Responsibility](#)), requests for file upload should be sent to webteam@nsf.gov by the directorate Coordinating Webmaster (program announcements/solicitations formatted in PIMS will be forwarded directly to IDB/Webteam for upload).
- The NSF Webteam will manage the servers to ensure 24/7 availability of information.
- The NSF Webteam will actively monitor server loads and access times to ensure a high-quality experience for users of NSF web sites.

Central Web Servers and Software

Current Infrastructure

server	role	Hardware	Software
Web Servers			
www.nsf.gov	Production server also hosts www.cise.nsf.gov itr.nsf.gov www.nano.gov oig.nsf.gov olpaimages.nsf.gov www.eng.nsf.gov www.geo.nsf.gov	ES-250 (dual)	Solaris 2.8 Netscape I- Planet 4.x (JSP) Verity Vignette 5.6.2 Cold Fusion 5 Perl 5.6 Tomcat Servlet Engine 4.1
webstage.nsf.gov	Content development/Staging/ review hosts www-dev.nsf.gov inside-dev.nsf.gov web management applications (on webstage.nsf.gov) cise-dev.nsf.gov pims.nsf.gov eng-dev.nsf.gov geo-dev.nsf.gov	ES-250 (dual)	Same
w4dev.nsf.gov	ApplicationDevelopment hosts www-appdev.nsf.gov inside-appdev.nsf.gov pims-appdev.nsf.gov cise-appdev.nsf.gov	ES 250	Same
inside.nsf.gov	Internal production	ES-250	Same
Database Servers			
webdbprod	Production db	ES-250 (single)	Solaris 2.8, Sybase 12
webdbprod2	Development db	ES-250 (single)	Solaris 2.8, Sybase 12
File Servers			
webdevel-01	File storage (int-dev and ext- dev shares)	NT	none

An offsite hosting server is available for multimedia content. This server supports RealMedia for streaming video as well as static formats such as QuickTime, MPEG, etc. Multimedia content is not hosted on the NSF servers to save bandwidth for other content. No multimedia files should be posted on the NSF

production server (www.nsf.gov). As with other web content, multimedia files should be compatible with as many operating systems and browsers as possible to ensure access by the widest possible audience.

All servers except the multimedia server are jointly maintained by DAS and DIS.

Network and Distributed Servers

- Directorates will publish their content on the central web server unless they require services that cannot be accommodated by the central web infrastructure.
- DIS will support networking of directorate-level web servers as necessary.
- Directorate-level servers that provide information to the public must be administered by the directorate to ensure security and 24/7 availability.

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[III.3.B. Quality Assurance](#)

[III.4. Running & Maintaining a Site](#)

This section describes the current procedures for [planning/developing](#), [testing/posting](#), and [running/maintaining](#) an NSF web site. These procedures will evolve as [web software](#) standards on the NSF web change. Planned changes to procedures will be discussed with Coordinating Webmasters.

Central Web Support

Support for the central NSF servers (www.nsf.gov and www.inside.nsf.gov) is provided by DAS's Information Dissemination Branch (IDB) in Room 245. The Branch's two sections-- *Web Engineering and Operations* and *Design and Publishing* -- provide technical and design services to NSF web publishers.

Information Dissemination Branch Chief:

[Leland Scott](#) (703/292-7561)

Web Engineering and Operations Section (WEBOPS)

Also known as the NSF Webteam, this section provides technical guidance, applications development, infrastructure engineering, and web page and web site maintenance operations for the NSF web site. The Section is responsible for establishing guidance and technical standards for NSF web dissemination activities, developing novel NSF information products and web publishing approaches, developing and overseeing procedures and responsible for setting up accounts so webmasters and web developers can publish content to the development/staging and production servers and for moving NSF web content from development/staging environments to the production web servers when requested. The Section provides expertise to NSF publishers in web server technologies and resources, strategies for integrating database information in a web environment, and web application development in a variety of languages, such as Perl, Cold Fusion, server-side JavaScript, etc. System administration support is provided by David Lien.

The email address for the NSF Webteam is webteam@nsf.gov.

Request for file uploads should be sent to webteam@nsf.gov. This email is checked by WEBOPS staff daily between 7:00am-5:00pm. After-hours or rush

support for critical projects is often available as long as advance notice is provided.

NSF Webteam Leader:

[Theresa Rinehart](#), Section Head (703/292-7559)

NSF Webteam:

[Rosalind Coward](#), (703/292-7010)

[Maryam Jami](#), (703/292-7533)

[David Lien](#), (703/292-4258, pager: 202/539-0565)

[John Noble](#), (703/292-7551)

Design and Publishing Section

In addition to its responsibilities in traditional print publishing, this section provides user-interface design guidance, web site design, web application development, document conversion and formatting, and web page update services for the NSF web site. The Section is responsible for establishing and overseeing best practices and technical requirements for NSF web page and site design, navigation, and graphics. The Section Head provides expertise to NSF in web interface standards, web browser technologies, web accessibility issues, PDF publishing, and open and evolving web document and web page programming standards such as HTML, CSS, and JavaScript.

Design and Publishing Leader:

[Peggy Gartner](#), Section Head (703/292-7535)

Team Members:

[Jim Caras](#)(703/292-7529)

[Debbie Coleman](#)(703/292-7544)

[Kelly DuBose](#) (703/292-7532)

[Terri Edillon](#) (703/292-7521)

[Chris Gordon](#)(703/292-7538)

[Edward Wright](#) (703/292-7574)



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III.1. Planning/Developing

Webmasters and anyone involved with web planning and/or developing a new site should be familiar with the following procedures and have basic knowledge of HTML. If you have any questions about the procedures, please contact the NSF webteam@nsf.gov.

Keep in mind that if you are developing web pages, you may need additional disk space and RAM for selected web software and graphics applications. The following specific steps must be followed when planning a new NSF web site:

1. Plan the content for your site in accordance with the standards outlined in the Policy section [II.2. Content](#) .
2. When you have outlined the components of your new web site, contact the NSF Webteam Leader and/or the NSF Webteam to discuss plans for the project and options. The NSF Webteam is located in Room 245 and the email address is webteam@nsf.gov.
3. Read and understand the required and recommended practices for NSF web sites (see section [IV. Best Practices & Technical Requirements](#)). If a contractor prepares your site, be sure to provide them a copy of these.
4. Ensure that the project will be staffed in accordance with the standards outlined in the Author/Webmaster Responsibilities in the Policy section [II.1. Authorship](#).
5. Determine your plans for converting existing documents or reviewing existing documents for publishing on the NSF web.
6. If you are doing the design work yourself, select a set of authoring and conversion tools.
7. Consult with IDB staff if you have questions about HTML, graphics, Javascript, authoring tools, and/or document conversion.
8. Consult with the NSF Webteam and/or NSF Webteam Leader if you have

questions about database integration or other CGI applications.

9. Test content on a local system or on the NSF web development file server (see section [III.2. Testing/Posting a Site](#)).
10. Your testing should include application of the [checklists](#) referred to section [IV. Best Practices & Technical Requirements](#) and running the files through [WebCheck](#).

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III.2. Web Database Applications

You can develop the initial data model in the tool of your choosing. You should review the model with the IDB database administrator, Bashir Shaikh to check that:

- you haven't used illegal field names (e.g., Sybase won't allow a column named "access")
- the data model is normalized, and table structure and data types are appropriate
- table indexes are created as needed

Tables for this application will be created inside a shared database for your directorate. Your tables will have a separate owner, so that you can control access to the data. NSF-wide application tables will be created in nsfwdb.

The database will be created first on the staging DB Server, w3dev; Bashir will set up your user account and will create Cold Fusion read-only and admin accounts. The webteam will set up the CF datasources. Initial development work should be done on the w3dev/appdev server, and then moved to webstage for final quality assurance and pre-production staging. At the same time, a production version of the database will be set up, and CF datasources created on the webstage and production servers.

Bashir and the webteam will review the application, to check that queries are optimized and that the application is secure. Things to keep in mind:

- avoid "select *" type queries
- consider using stored procedures for intensive queries
- validate user-supplied data



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III.3. Testing/Posting A Site

Once you have tested your content locally on a PC or on the NSF development file server, you will need to move your site to the NSF web staging server for further testing.

Follow these steps to test your site on the NSF web:

NSF has two servers available for testing applications and reviewing web sites prior to publication.

The w4dev server is primarily for application development. It hosts www-appdev.nsf.gov and www.inside-appdev.nsf.gov. Generally only application developers need accounts on this server. Coordinating webmasters should send account requests to webteam@nsf.gov.

Applications that have completed preliminary testing, and all other web content, should be reviewed on the webstage server. This server hosts

www-dev.nsf.gov
www.inside-dev.nsf.gov
www.cise-dev.nsf.gov
www.geo-dev.nsf.gov

Each staging server is set up identically to the production version. Files should be uploaded to the same location **at which** they are to be installed on the production server. Training on how to use WinSCP to transfer files to the webstage server is available from the Web Operations and Engineering Section.

Requests for accounts on the webstage server should be sent to webteam@nsf.gov by the Coordinating webmaster. The request should specify which folders on the Directorate or Division web site the user is to have access to.

Site Manager, a web-based tool, is available for users who want to publish files to, and delete files from, the production servers. Accounts and training can be

obtained by emailing webteam@nsf.gov. Before uploading files, users must check the box certifying that the pages or application meets NSF content, accessibility and security standards.

Users can also request that the webteam publish files for them, by emailing a request to webteam@nsf.gov. Requests are usually handled the same day. Requests should include the current location of the files, the location the file should be published to and the following certification:

I certify that I have checked representative pages' accessibility by using a screen reader, a text-based browser, or NSF's access gateway tool, and the pages are in compliance with NSF accessibility requirements as stated in the [NSF Web Development Policy and Standards Manual](#). In addition, I certify that any scripts or dynamic templates meet the [security requirements](#) defined in the Manual, and that all content meets the requirements of NSF security policies.

If your content needs to be password protected, please see section [III.2.A. Security](#) to secure your documents.

Bashir and the webteam will review applications, to check that queries are optimized and that the application is secure.

Your development web site must be designed to be self-contained. Use [relative URL references](#) in all cases so that your content can be moved to another directory on the NSF web without disrupting any links. Make sure all URL references are relative and all links to start pages are at the directory level.

Each webmaster should follow their own directorate or division established procedures for testing and approving their content prior to publishing content to a website (see Policy section [II.1. Authorship](#)).

If your document includes a form, the Webteam should be notified so the form can be added to the Online Document System (ODS) (see Best Practices & Technical Requirements section [IV.1.A. Required Practices - Web](#)).

If "fill-out" versions of the word forms are supplied, be sure to provide the password needed to unlock the form. Preferably it should be the same one as all other NSF forms – NSFFORMS (all caps, no spaces).



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III.3. Testing/Posting a Site

A. How to Secure Web Pages

All NSF webmasters and web developers should familiarize themselves with NSF's security policies.

- Create a directory to hold all "secure" pages and documents. For example: y:das\protect.
- Choose a good user name and password for the secure area. These should be non-obvious (no dictionary words). For example: "nsfcov" for the username, and "WEBsecuRe" (note the mixed case) for the password. All users will use the same username/password combo.
- Send a request for the secure directory, along with the username and password, to webteam@nsf.gov. The Webteam will then create an empty directory on the server.
- The Webteam will request that security be set for the directory.

From this point forward, anything placed in the secure directory will be protected*.

- Examples of content currently on protected directories are meeting minutes and agendas.
- SBE/SES, BIO and MPS are using this technique to protect their secured material online as well.

See Best Practices & Technical Requirements section [IV.3. Security](#) for more detailed information.

* Truly sensitive content should not be placed on the outside server. Please contact [WEBOPS](#) for more information on security.



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III.3. Testing/Posting a Site

B. Required Quality Assurance Procedures

1. Test new pages on the following platforms and browsers:
 - o 32 bit Windows running Navigator 4.x and IE 4.x.
 - o If your page contains JavaScript, you must also test your page with a non-JavaScript browser such as NCSA Mosaic and JAWS.
 - o If possible, also test your pages on computers running 16-bit Windows or higher, and some flavor of Unix.
 - o IDB provides a web lab in Room 245 where you can test your pages and applications in:
 - Windows XP, IE 5.x
 - Windows 98, IE 5.x
 - Windows XP, IE 6.x
 - Windows 98, IE 6.x
 - Windows 98, Netscape 7
 - Windows XP, Netscape 7
 - Mac OS X, IE 5.x, Mozilla/Netscape 7
 - Linux, Mozilla/Netscape 7
2. Test new pages at 600x800, and 1024x768 resolutions, and make adjustments as necessary to optimize the display for each.
3. Test new graphics on monitors that support both 256 colors and 24-bit color to ensure the best possible appearance for users on both high- and low-end systems.
4. Run each new or substantially revised site through [WebCheck](#), which checks for general site errors as well as most NSF web and accessibility required practices.



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III. Procedures

III.1. Planning/ Developing a Site

III.2. Web Database Applications

III.3. Testing/ Posting a Site

III.3.A. Security

III.3.B. Quality Assurance

III.4. Running & Maintaining a Site

III.4. Running/Maintaining a Site

When your NSF web site goes into production, it will be linked to the appropriate area of the NSF web site or Inside NSF. The webmaster is responsible for maintaining the site, following the policy outlined in the Policy section [II.1. Authorship](#).

As part of the responsibility associated with maintaining NSF web sites, the webmaster will ensure that new content added to the site is consistent with the required practices in section [IV. Best Practices & Technical Requirements](#).

Webmasters should continually strive to investigate and implement ways to enhance their sites with new capabilities that can make sites more useful.

Broken Links

The broken link report runs on both internal and external NSF web sites. These reports are monitored by the Webteam weekly. Webmasters will be notified of broken links and be given a reasonable amount of time to update these links.

Webmasters should regularly review the broken link reports to avoid broken links.

- External broken link report http://www.nsf.gov/admin/check_web/
- Internal broken link report http://www.inside.nsf.gov/admin/check_web/

Outdated Content

Webmasters should also monitor web pages so that the content and design are updated as necessary (documents located on the ODS are excluded as they have expiration dates).



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III. Procedures

III. Procedures

III.1. Planning/ Developing a Site

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III.3. Testing/ Posting a Site

III.3.A. Security

III.3.B. Quality Assurance

III.4. Running & Maintaining a Site

A URL (Uniform Resource Locator) is a description of the location of a link or image file. It specifies the protocol (http:// for a web page), site name, path and file name to the resource, e.g., http://www.nsf.gov/home/news.html. This is called an absolute URL. By comparison, a relative URL omits the "protocol" and "site name" parts of the absolute URL and references only the "path and file name," e.g., /home/news.html.

For more information on URLs:

- [WWW Names and Addresses](#), URIs, URLs, URNs located on the WC3 Home Page
- A [Beginner's Guide](#) to URLs, located on the NCSA Mosaic Help menu



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IV. Best Practices & Technical Requirements

IV. Best Practices & Technical Requirements

IV.1. Required Practices

IV.1.A. Web

IV.1.B. Web Accessibility

IV.1.C. Checklists

IV.2. Recommended Practices

IV.2.A. Web

IV.2.B. Web Accessibility

IV.3. Security

This section covers useful and necessary elements that web developers use to create web pages for the NSF Intranet and/or Extranet.

IV.1. Required Practices:

These elements are necessary for all NSF web developers to follow when creating NSF web sites. Web developers are required to certify that pages meet NSF accessibility requirements when using Webstage Manager to move files to production. Also, the Webteam will not knowingly upload pages that do not meet these practices. Checklists are also available in this section so that web developers can verify Required Web Practices and Required Accessibility Practices. In addition, web developers can use [WebCheck](#) to check if a page or site complies with most Required Web Practices and Required Accessibility Practices.

IV.2. Recommended Practices:

These elements are recommended practices that all NSF web developers should be familiar with. Although these elements are not required before web pages are published, they are informational and good practice for all NSF web developers.

IV.3. Security:

This section has essential security information and resources for all system administrators, CGI developers, and Webmasters.



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Web Development Policy & Standards

IV. Best Practices & Technical Requirements

IV. Best Practices & Technical Requirements

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IV.1.A. Web

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IV.1.C. Checklists

IV.2. Recommended Practices

IV.2.A. Web

IV.2.B. Web Accessibility

IV.3. Security

IV. 1. Required Practices

A. Web

NSF Site Identification

External NSF web pages should:

- Include an approved NSF logo on all home pages and major sections of a site (see [Graphical Resources and Logos on the NSF Web Site](#)).
- Identify the site as part of the National Science Foundation (for example in the title or in a footer element).
- Provide a link to the NSF home page.
- Provide links to the Directorate/Division parent pages.

Required Tags and Page Layout

- HTML documents must follow this structure:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
<TITLE>Meaningful Title</TITLE>
</HEAD>
<BODY>
    page contents
</BODY>
</HTML>
```

- Start page titles should include "NSF" and clearly and uniquely identify each document:
Good: NSF: BioComplexity Program Announcement (NSF 00-22)
Bad: Program Announcement
- Include an email link for the site webmaster or other contact information.
- Include the last modified date (See [Last Modified Date](#)).
- If frames are used, provide a <NOFRAMES> alternative.

- <META> tags or HTML comments should be used to identify the author, file creation date, and file expiration date if appropriate.
- Indicate the date and author of subsequent edits to the page inside an HTML comment. Example: <!-- Program contact name changed 3-22-2000 jsmith/idb -->
- Pages should be kept as small as possible (150 Kb or smaller suggested for web pages including linked graphics), break up large documents as appropriate.
- HTML 4.0 tag specification must be used.

File and Folder Names

- Use an underscore or dash to represent "spaces" in filenames.
- Use upper and/or lowercase letters; however note that URLs on all servers are case sensitive.
- Use extensions – gif or jpg for graphic images.
- Keep file names short and use the document number where possible and/or appropriate.
- Do not use punctuation or non-alphanumeric characters in file names.

Examples:

nsf0014.pdf (give size)

nsf0014.htm

nsf0014.html

nsf0014.txt (not asc)

nsf0014.doc

logo.gif

logoa.gif

logo_1.gif

- Both .htm and .html extenions are supported - verify that links are pointing to the correct file name and extention.
- Review HTML file to verify that same text is used – particularly with the gif and jpg file names – i.e., Image4.gif – this should be Image4.gif in the text as well as the actual file name.
- Multipage documents should name the first page in a directory start.html or index.html.

PDF Standards

- When converting a file to PDF format, follow Adobe's [Optimizing Adobe PDF Files for Accessibility](#).
- When linking to a PDF file from an HTML file, put in parentheses the file size (i.e., view the pdf file of this document (76 Kb)).
- Make sure each PDF file has bookmarks.
- If the PDF file size is large (beyond 150 Kb) - break the PDF file into smaller pieces (i.e., chapters) and create an initial HTML file with appropriate links to the broken down files (e.g., see www.nsf.gov/bfa/bud/fy2003).
- If the PDF file contains tables or graphs that may not be accessible, provide links in the HTML file to the tables and charts in Excel format. (e.g. see www.nsf.gov/pubs/2001/ceose2000rpt/). If this is not possible, provide a contact for users who have trouble accessing the information (e.g. see www.nsf.gov/pubs/2003/nsf03023/toc.htm).

Note: Web pages requiring a plug-in or viewer must provide a link to the plug-in or viewer (see [IV.1.B Web Accessibility](#)). NSF maintains a plug-in and viewer page at www.nsf.gov/home/pubinfo/plugins.htm.

- Change the default "Document Info/Open" option to "Bookmarks and Page".
- Change the default "Document Info/Open" magnification option to "Fit Width."
- Make sure the Title field in the "Document Info/General" dialogue box contains the title of the publication, followed, in parentheses, by the NSF publication number.
- Make sure the Author field in this dialogue box contains the authors name and the directorate/division.

PowerPoint Standards

- When saving a PowerPoint file as HTML, make sure all graphics (i.e., charts, graphs, etc.) have a textual explanation in the HTML file.
- If the HTML file is created using frames, make sure the frames are labeled according to the [Web Accessibility Standards](#).

Page/Content Considerations

- Use the clearest and simplest language appropriate for the site's content. See NSF's [Plain Language Guidelines](#).
- Pages collecting personal data or feedback (through a form or by requesting email) should state how the data will be used and link the page to the [NSF privacy policy](#). Data collection forms may require the approval of the NSF Reports Clearance Officer. See the [Paperwork Reduction Act page](#) for more information.

- The same procedures and standards that apply to printed documents at NSF apply to NSF web pages. In particular, any document related to the announcement of programs, solicitation of proposals, award administration, or agency policy must be submitted for NSF clearance if it has not been previously cleared for printed distribution. (see Policy section [II. 2. Content](#))

Style Considerations

- Documents should be logically structured using HTML.
- Use mixed case for titles and text.
- Use a dark colored text on a light colored background.
- Use cascading stylesheets not tags.
- Use a moderate font size (no smaller than small or 60%) for large sections of text.
- In style sheets, specify font sizes in relative measurements (ems, percentages, etc). Do not use points to specify font size as this makes the page hard to print, and prohibits users from adjusting the font size in their browser.
- Do not use the <blink> or <marquee> tags (see Best Practices & Technical Requirements section [IV.1.B. Web Accessibility](#)).
- If tools that generate HTML from Microsoft 2000 programs are used (such as Word, Powerpoint, or Frontpage), the export options need to be set to "Cross Browser", or the document may not be viewable in non-Microsoft browsers.
- Avoid using the default blue link color for text as it implies that the text is a hyperlink.
- All links, except those used in standard navigational elements should be underlined.
- Preferably links should be blue.
- Avoid using the link color for other text, as this implies the text is a hyperlink.
- Use the underline tag (<u>) for links only. Using the tag for regular text implies it is a hyperlink.

Code Level/Browser Considerations

- Documents must validate as correct HTML.
- Use HTML comments to annotate complicated layouts.
- NSF pages must degrade gracefully to Netscape and IE 4 and above browsers.
- Provide alternative, non-windows fonts, e.g., font-family: Arial, Helvetica, sans-serif.
- If Javascript navigation widgets are used, provide non-Javascript alternatives.
- Use Java applets only if absolutely necessary, and provide alternate methods for users to obtain the same information.

- Don't use cookies without warning the user and allowing them to decline the cookie (see Policy section [II.2. Content](#)).
- Links to start pages should be at the directory level.
- Avoid using Javascript that uses the browser status bar to display a ticker or other information.

Graphic Considerations

- Create graphics using a [web safe palette](#) and save them in the minimum number of colors needed.
- Use GIFs for line art and simple pictures and JPEGs for photos and complex pictures.
- Display images at actual size: don't use the height and width attributes to change the apparent size of an image. Create separate thumbnails where needed.
- Use background graphics sparingly.
- Always use height and width tags.
- Always provide alt tags for meaningful images.
- Do not use copyrighted images without permission.
- Avoid clipart and/or unnecessarily animated images (see [DPS](#) for customized images/pages).

Form Considerations

- Validate all form data.
- Read the [Paperwork Reduction Act page](#) to see whether formal clearance is needed.
- Form pages must include an email address, telephone, and/or fax number for users to contact in case they cannot successfully use the form (see Best Practices & Technical Requirements section [IV.1.B. Required Practices - Web Accessibility](#)).

Security Considerations

- Maintaining the security of NSF web servers is the joint responsibility of all system administrators, developers, and content providers (see Best Practices & Technical Requirements section [IV.3. Security](#) for detailed information).

[NSF WDPS](#) | [Introduction](#) | [Policy](#) | [Procedures](#) | [Best Practices & Technical Requirements](#)



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IV. Best Practices & Technical Requirements

IV. Best Practices & Technical Requirements

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The Required Practices for Web Accessibility have been created to help NSF conform to Section 508 of the Rehabilitation Act which requires access to the Federal government's electronic and information technology. The [Access Board](#) has published the [final standards for electronic and information technology](#) as of December 21, 2000. These standards require Federal agencies to be in compliance with these final standards as of June 21, 2001. A detailed list of the final standards, with comment, for Web-based Intranet and Internet Information and Applications can be found in section [1194.22](#).

The Required Practices for Web Accessibility incorporate the Access Boards [final standards](#), and NSF developers are required to follow these practices.

The Required Practices for Web Accessibility contain important information from the [Access Board's final standards](#) as well as the "[World Wide Web Consortium \(W3C\)](#) Techniques for Web Content Accessibility Guidelines." Where appropriate, links to sections of the W3C Guidelines are provided on example pages for more detailed information.

All information published on the NSF Web site must be provided in an accessible format. (HTML or ASCII)

Please Note: PDF can be made accessible by formatting the document correctly ([Optimizing Adobe PDF Files for Accessibility](#)) - PDF files can be checked for accessibility by running them through the adobe document server located here: http://www.nsf.gov/ads-cgi/do_conv.pl?filename= (add the URL here (to include http://) where the file is located). Also see [PDF Standards VI.1](#).

A. Web.

Auditory, Visual, and Multimedia Content

1. A meaningful text equivalent ("alt", "longdesc", etc.) attribute must be used for every significant or meaningful non-text item. Ensure the text equivalent has no ambiguous abbreviations or computerese. ([Example](#)) (*corresponds with Access Board's final standard (a)*)
2. Client-side image maps will be used whenever possible in place of server-side image maps (don't forget alt tags). If server-side image maps are used, redundant text links must be provided for each active region of the image map . ([Example](#)) (*corresponds with Access Board's final standards (e & f)*)
3. Provide captioning of all audio tracks. ([Example](#)) (*corresponds with Access Board's final standard (a)*).
4. Equivalent alternatives for any multimedia presentation will be synchronized with the presentation. Audio descriptions of important segments of video tracks must be inserted during natural pauses in the narrative. ([Example](#)) (*corresponds with Access Board's final standard (b)*)

Color

5. Web pages must be designed so all information required for navigation or meaning is not dependent on the ability to identify specific colors. ([Example](#)) (*corresponds with Access Board's final standard (c)*)

Embedded Applications and Scripts

6. Web pages must be usable when scripts, applets, or other programmatic objects are turned off or are not supported, or provide equivalent information on an alternative accessible page. ([Example](#)) (*corresponds with Access Board's final standard (l)*)
7. Web pages requiring an applet, plug-in or other application present on a user's system to interpret page content, must provide a link to that plug-in or applet. Programmatic elements such as Java, Shockwave, and Flash must be directly accessible or compatible with assistive technologies. ([Example](#)) (*corresponds with Access Board's final standard (m)*)

Frames

8. Frames must be titled with frame identifications and navigation (using the

"title" and "name" attributes). ([Example](#))*(corresponds with Access Board's final standard (i))*

Navigation

9. Targets of each link must be clearly identified. (Avoid using "click here.") ([Example](#))*(corresponds with Access Board's final standard (a))*
10. Unique and descriptive page titles must be included in the TITLE element. ([Example](#))(NSF requirement see section [IV.1.A.](#))
11. An appropriate method must be provided to provide users of assistive technology the option to skip repetitive navigation links. ([Example](#))*(corresponds with Access Board's final standard (o))*

Cascading Style Sheets

12. Web pages must be organized so they are readable without requiring an associated style sheet. ([Example](#))*(corresponds with Access Board's final standard (d))*

Forms

13. Electronic form pages must be labeled appropriately so that people using assistive technologies can use the forms as well as including contact information. ([Example](#))*(corresponds with Access Board's final standard (n))*

Tables

14. Data tables must provide identification of row and column headers. ([Example](#))*(corresponds with Access Board's final standard (g))*
15. Markup must be used to associate data cells and header cells for tabular data tables that have two or more logical levels of row or column headers. ([Example](#))*(corresponds with Access Board's final standard (h))*
16. Tables should not be used solely for layout unless the table transforms gracefully when linearized. If the table does not make sense when linearized, an alternative must be provided. ([Example](#))*(corresponds with Access Board's final standard (k))*

Time-sensitive Content Changes

17. Do not enable the screen to flicker. (Do not use <MARQUEE>.) Do not

enable the screen to blink. (Do not use <BLINK>.) ([Example](#))
(corresponds with Access Board's [*final standard \(j\)*](#))

18. When a timed response is required, the user will be alerted and given sufficient time to indicate more time is required. ([Example](#)) (corresponds with Access Board's [*final standard \(p\)*](#))

DON'T FORGET TO VALIDATE ACCESSIBILITY

[NSF WDPS](#) | [Introduction](#) | [Policy](#) | [Procedures](#) | [Best Practices & Technical Requirements](#)

¹ The content for this portion of the NSF Web Development Policy & Standards Manual has been modified from the [World Wide Web Consortium \(W3C\) Website](#).



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Validation

Validators are automated tools (Internet-based or built into HTML editors) that check to see whether an HTML document meets accessibility standards. However, **no validator can replace knowledge of the requirements for accessible coding.** There are many accessibility requirements (such as the correct use of color) that a validator will not detect.

The NSF web team has implemented a "text-only" gateway called "Betsie" to the NSF web site. Betsie was originally developed in the U.K. for BBC web sites. This gateway parses all HTML pages on a site and rewrites them in a simple text-only format. The parser does a variety of manipulations on web pages, including:

- Linearizes tables (rearranges content into the order a screen reader would read)
- Translates ALT values for images and other graphical objects
- Removes text formatting and style sheets
- Removes JavaScript
- Retains forms, most of which work as usual

In addition, we have customized [Betsie](#) so that it turns links to PDF files into links that parse PDF files into accessible HTML files through the Adobe Document Server.

****Please validate pages through the [Betsie](#) parser to make sure your pages can be viewed appropriately in "text-only" format.****

In addition, the NSF Webteam has implemented [WebCheck](#), which checks for NSF web and accessibility required practices.

Developers must know the coding guidelines, and use Betsie, [WebCheck](#) and other validators only to double-check that the [Required Practices for Web Accessibility](#) have been met.

In an effort to keep accessibility issues current, IDB has installed JAWS locally to a PC in room 245. JAWS is the industry standard in screen reading software. Appointments can be made with IDB staff to view web pages with the JAWS screen reader.

NSF Webmasters should use the [Accessibility Checklist](#) and [WebCheck](#) to verify web pages before posting them to the Web.

Additional Resources for Web Accessibility:

The [W3C Tools page](#) lists several online accessibility validators. These include:

- [The W3C Validator](#)

This will also issue warnings about any incorrect HTML coding. The error messages can be somewhat confusing.

- [Bobby](#)

Bobby mainly checks for missing alt tags, and provides reminders about manually checking the page for compliance with other standards.

- [NIST](#)

A very nice validator that separates accessibility from other coding concerns.

In addition, [Hotmetal Pro 6.0](#) has a very good validation system, but requires that the software be loaded locally. LIFT for DreamWeaver validates as well as fixes accessibility violations.

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¹ The content for this portion of the [NSF Web Development Policy & Standards Manual](#) has been modified from the [World Wide Web Consortium \(W3C\) Website](#).





Web Development Policy & Standards

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Auditory, Visual, and Multimedia Content

EXAMPLE

1. A meaningful text equivalent ("alt", "longdesc", etc.) attribute must be used for every significant or meaningful non-text item. Ensure the text equivalent has no ambiguous abbreviations or computerese. ([W3C](#))

Non-text items include: images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ASCII art, frames, scripts, images used as list bullets (i.e. item or CSS), graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.

- If the image has meaningful content an "alt" tag that clearly describes the image must be used. Alt tags for spacers or rules are not required unless those images are being used to convey structural information about the document.

Be sure to describe the purpose of the image as completely as possible, e.g., avoid using "click here" or "continue."

EXAMPLES:



Good example of HTML code:

```
<IMG SRC="065th.gif" ALT="Photograph of  
Cray Supercomputer" WIDTH="128"  
HEIGHT="91">
```

Bad example of HTML code:

```

```

- Use "alt" for the , <INPUT>, and <APPLET> elements, or provide a text equivalent in the content of the <OBJECT> and <APPLET> elements.
- For complex content (e.g., a chart) where the "alt" text does not provide a complete text equivalent, provide an additional description using, for example, "longdesc" with or <FRAME>, a link inside an <OBJECT> element, or a description link - *these technologies are only supported by Netscape 6.0 and above and Internet Explorer 4.0 and above*.

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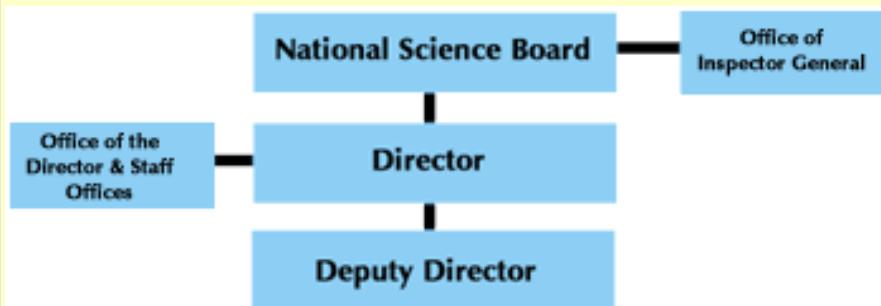
Auditory, Visual, and Multimedia Content

EXAMPLE

2. Client-side image maps will be used whenever possible in place of server-side image maps (don't forget alt tags).([W3C](#)) If server-side image maps are used, redundant text links must be provided for each active region of the image map. ([W3C](#))

Provide text equivalents (alt text) for client-side image maps. If <AREA> is used to create the map, use the "alt" attribute.

EXAMPLE: Image map



Good example of HTML code:

```
><map name="OrgChart">

<area shape="rect" coords="2,53,95,92" href="http://www.inside.nsf.gov:80/od/start.htm" alt="Office of the Director & Staff Offices" title="Office of the Director & Staff Offices" target="\_parent">

<area shape="rect" coords="110,3,277,39" href="http://www.nsf.gov/nsb/start.htm" alt="National Science Board" title="National Science Board" target="\_parent">

<area shape="rect" coords="111,52,276,91" href="http://www.nsf.gov/od/lpa/forum/lane/quscipol.htm" alt="Director" title="Director" target="\_parent">

<area shape="rect" coords="109,100,276,142" href="http://www.nsf.gov/od/lpa/forum/bordogna/start.htm" alt="Deputy Director" title="Deputy Director" target="\_parent">

<area shape="rect" coords="304,1,398,41" href="http://www.inside.nsf.gov/oig/oigins.htm" target="\_parent" alt="Office of Inspector General" title="Office of Inspector General">></map>

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<sup>1</sup> The content for this portion of the [NSF Web Development Policy & Standards Manual](#) has been modified from the [World Wide Web Consortium \(W3C\) Website](#).



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# IV. Best Practices & Technical Requirements

## IV. 1. Required Practices

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### Auditory, Visual, and Multimedia Content

#### EXAMPLE

##### 3. Provide captioning of all audio tracks. ([W3C](#))

Auditory presentations must be accompanied by text transcripts, textual equivalents of auditory events. When these transcripts are presented synchronously with a video presentation, they are called captions and are used by people who cannot hear the audio track of the video material.

#### EXAMPLE:

*Audio Track of Advertising Campaign: Delivery person rings door bell twice.*

[Delivery person rings door bell]

[rings again]

[door is opened by occupant]

"Hi, I'm here to deliver...."

Equivalents for sounds can be provided in the form of a text phrase on the page that links to a text transcript or description of the sound file. The link to the transcript should appear in a highly visible location such as at the top of the page. However, if a script is automatically loading a sound, it should also be able to automatically load a visual indication that the sound is currently being played and provide a description or transcript of the sound.

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#### Auditory, Visual, and Multimedia Content

##### EXAMPLE

4. **Equivalent alternatives for any multimedia presentation will be synchronized with the presentation. Audio descriptions of important segments of video tracks must be inserted during natural pauses in the narrative. ([W3C](#))**

Auditory descriptions of the visual track provide narration of the key visual elements without interfering with the audio or dialogue of a movie. Key visual elements include actions, settings, body language, graphics, and displayed text. Auditory descriptions are used primarily by people who are blind to follow the action and other non-auditory information in video material.

For movies, provide auditory descriptions that are synchronized with the original audio.

## EXAMPLE:

### ***Video of Speech from NSF Director - The National Science Foundation's Role in the Arctic:***

Dr. Rita A. Colwell: "How can we grasp this enormous complexity of our world, our planet? This is something that science, engineering and technology must help us to do...."

[Dr. Colwell pauses while a hand goes up in the audience to ask a question]

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#### Color

#### EXAMPLE

5. Web pages must be designed so all information required for navigation or meaning is not dependent on the ability to identify specific colors. ([W3C](#)) & ([Lighthouse International](#))

Persons with visual deficiencies and color blindness will not be able to follow instructions when the information/instructions require the user to identify color. Therefore, design web pages to be color independant.

Avoid using black backgrounds as well as a red/green combination as these are the most difficult for users with visual deficiencies to conceptualize.

## **EXAMPLE:**

### **Do Not Create Pages such as:**

For FastLane instructions, read the **items listed in RED**.

For paper proposals, read the **items listed in GREEN**.

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#### Embedded Applications and Scripts

##### EXAMPLE

6.

**Web pages must be usable when scripts, applets, or other programmatic objects are turned off or are not supported, or provide equivalent information on an alternative accessible page. ([W3C](#)) and ([W3C](#))**

For example, if Java is used for navigation, and the user has Java turned off on their browser, text equivalents are needed for the user to navigate the page.

If an applet (created with either OBJECT or APPLET) requires user interaction (e.g., the ability to manipulate a physics experiment) that cannot be duplicated in an alternative format, the applet must be made directly accessible.

For more information about developing accessible applets, please refer to [[JAVAACCESS](#)] and [[IBMJAVA](#)]. These companies have been developing an Accessibility Application Program Interface (API) as well as making the Java Swing classes accessible.

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### Embedded Applications and Scripts

#### EXAMPLE

7. Web pages requiring an applet, plug-in or other application present on a user's system to interpret page content, must provide a link to that plug-in or applet. Programmatic elements such as Java, Shockwave, and Flash must be directly accessible or compatible with assistive technologies. ([W3C](#))

Make sure pages that require plug-ins, such as [Adobe's Acrobat Reader](#), include links to those plug-ins.

Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.

When an embedded object has its "own interface," the interface -- like the interface to the browser itself -- must be accessible. If the interface of the embedded object cannot be made accessible, an alternative accessible solution must be provided.

Provide a [text equivalent as for an image](#) and auditory descriptions of visual information and captions where

necessary. If an applet creates motion, developers should provide a mechanism for freezing this motion (for an example, refer to [[TRACE](#)]).

For more information about developing accessible applets, please refer to:

- Java: [[JAVAACCESS](#)] and [[IBMJAVA](#)]
- [Macromedia Shockwave](#)
- [Macromedia Flash](#)

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#### Frames

##### EXAMPLE

8. **Frames must be titled with frame identifications and navigation (using the "title" and "name" attributes). ([W3C](#))**

Some screen-readers read framed pages row-by-row, as they do in tables, so information can become confused. Therefore it is important to title frames with frame identifications and navigation.

When frames are prepared properly, use of the frame can actually assist navigation of a web site for users of assistive technology devices by clearly isolating the navigation and other non-content elements of the page.

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## EXAMPLE:

HTML Code for a simple frameset:

```
<HTML>
<HEAD>
<TITLE>NSF Directorates</TITLE>
</HEAD>

<FRAMESET ROWS="20%,*" COLS="10%,*,10%*"
NAME="NSF Directorates" TITLE="Frameset of NSF
Directorates">
<FRAME SRC="nav.htm" NAME="Navigation"
TITLE="Navigation Bar">
<FRAME SRC="doc.htm" NAME="Content"
TITLE="Content for Directorates">

<NOFRAMES>
<A HREF="dir.htm" NAME="Directorates" TITLE="Link
to NSF Directorates"> Select to go to NSF
Directorates
</NOFRAMES>

</FRAMESET>
```

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#### Navigation

##### EXAMPLE

9. Targets of each link must be clearly identified. (Avoid using "click here."). ([W3C](#))

Link text should be meaningful enough to make sense when read out of context -- either on its own or as part of a sequence of links. Link text should also be terse. For example, in HTML, write "Information About NSF" instead of "click here." Screen readers need more information than "click here" to decipher where the link will take the user.

#### EXAMPLES:

Bad:

Grant information is available <A href="page.htm">here</A>.

Good:

Grant information is available on the <A href="page.htm">Grants & Awards page</A>.



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#### Navigation

##### EXAMPLE

10. Unique and descriptive page titles must be included in the <TITLE> element.

Page titles, when used correctly, offer the user an informative way to navigate throughout a site using the browser's Go menu. The page title becomes the title of the bookmark when the page is added to a list of bookmarks. Most browsers will use the address of a Web page if no title is provided. Pages that are properly labeled using the <TITLE> element are more easily identifiable. The <TITLE> element is required in the HTML 4.0 specifications.

Include page titles in the <TITLE> element, and make them descriptive. For example, use "NSF Site Help" instead of "Help." Also keep titles concise. The titlebar, bookmarks and Go menu have limited space to display text. The more concise the title, the more readable it is to the user when reviewing bookmarks or 'backing-up' using the Go menu.

Page titles are important for users of screen reading software. Some screen reading programs read the page title first when opening a page. Descriptive page titles help these users determine the page content quickly and easily.

Use of unique descriptive titles in the <TITLE> element also

ensures that results lists from the NSF search engine are meaningful.

### **EXAMPLES:**

#### **Good:**

<TITLE>NSF 00-2: Grant Proposal Guide</TITLE>

#### **Bad:**

<TITLE>Publication</TITLE>

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### Navigation

#### EXAMPLES

11. An appropriate method must be provided to provide users of assistive technology the option to skip repetitive navigation links. ([W3C](#))

Navigation is often the first item to appear on the page, and for users of screen-reading software this can be cumbersome to hear on each and every page. Providing a way to bypass these repetitive types of elements assists these users.

There are several ways to allow users to skip over navigation:

- Include a link that allows users to skip over the set of navigation links or use a transparent spacer .gif, linked to an anchor placed at the beginning of the content.
- Use the HTML 4.0 "tabindex" (see HTML help) attribute to allow users to jump to an anchor after the set of navigation links. However, this attribute is supported by IE 4.0 and higher and Netscape 6.0 and up.

## EXAMPLES:

In this example, the <DIV> element groups a set of links, the "class" attribute identifies it as a navigation bar, "tabindex" is set on an anchor following the group, and a link at the beginning of the group links to the anchor after the group.

```
<HEAD>
<TITLE>NSF Guide to Programs</TITLE>
</HEAD>
<BODY>
<DIV class="nav">
 [Bypass navigation bar]
 [nsf.gov]
 [About NSF]
 [Funding]
 [Publications]
 [News & Media]
 [Search]
</DIV>
<H1>Guide to Programs</H1>
<!-- CONTENT OF PAGE -->
</BODY>
```

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### Cascading Style Sheets

#### EXAMPLE

12.

**Web pages must be organized so they are readable without requiring an associated style sheet. ([W3C](#))**

To make sure Web pages using style sheets degrade gracefully in browsers, view pages with Style Sheets and Javascript turned off.

Keep in mind that using DHTML and other advanced techniques, when viewed in older browsers, can alter the meaning of the page.

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#### Forms

#### EXAMPLE

13.

**Electronic form pages must be labeled appropriately so that people using assistive technologies can use the forms as well as including contact information. ([W3C](#))**

Make labels associated with all form controls.

Make sure all web pages that include forms have an alternative way to receive/send the information.

#### EXAMPLE:

First name:

Last name:

*If you cannot use this form please contact us at:*

National Science Foundation  
4201 Wilson Boulevard  
Arlington, VA 22230, USA

Phone: 703-292-1234  
Fax: 703-292-4321  
Email: [webmaster@nsf.gov](mailto:webmaster@nsf.gov)

### **Code for Input Form Labels:**

```
<p><label for="firstname">First name:
<INPUT type="text" id="firstname" tabindex="1"
maxlength="50">
</label></p>

<p><label for="lastname">Last name:
<INPUT type="text" id="lastname" tabindex="2"
maxlength="50">
</label> </p>

<p><label for="submitbutton">
<input type="submit" name="Submit" tabindex="3"
value="Submit" alt="submit form"></label>
```

AND

### **Jump Menu Example:**

Search by Collection:

### **Code for Jump Menu:**

```
<label for="Collection">Search by Collection:
<SELECT name="Collection" id="Collection">
<OPTION value="All">All NSF Web Pages & Documents </
OPTION>
<OPTION value="ODS">NSF Documents (numbered pubs)
Only </OPTION>
</SELECT></label>
```

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#### Tables

#### EXAMPLE

14.

**Data tables must provide identification of row and column headers. ([W3C](#))**

Providing identification of row and column headers allows accessible browsers and other user agents to restructure or navigate tables in a non-visual manner. Use the `<TH></TH>` tag instead of the `<TD></TD>` tag to identify row and column headers.

## EXAMPLE:

HTML code for the following data table from the Budget Summary '00:

Integrative Activities supports the following programs:

(Millions of Dollars)

Programs	FY 2000 Estimate	FY 2001 Estimate	Percent Change
Biocomplexity	50.00	0.00	N/A
Major Research Instrumentation	50.00	50.00	0.0%
Opportunity Fund	0.00	32.00	N/A
Science and Technology Centers	25.00	20.00	-20.0%
Science and Technology Policy Institute	4.23	4.23	0.0%
Other Integrative Activities	0.00	13.00	N/A
Total, Integrative Activities	\$129.23	\$119.23	-7.7%

<TABLE BORDER=1>

<TR>

<TH>Programs</TH>  
<TH>FY 2000 Estimate</TH>  
<TH>FY 2001 Estimate</TH>  
<TH>Percent Change</TH>

<TR>

<TD>Biocomplexity</TD>  
<TD>50.00</TD>  
<TD>0.00</TD>  
<TD>N/A</TD>

</TR>

ETC...



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#### Tables

#### EXAMPLE

15.

**\*Markup must be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers. ([W3C](#))**

Some user agents allow users to navigate among table cells and access header and other table cell information. Unless tables are marked-up properly, screen readers will not provide users with the appropriate information. Be sure to use the following markup when creating data tables that have two or more logical levels of row or column headers:

**EXAMPLE:**

HTML code for the following data table:

Program Announcements Advertised:

Program	FY 1999				FY 2000			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
BIO	10	25	5	30	12	26	6	31
CISE	11	24	7	28	12	26	8	29

```
<table>
```

```
<tr>
<th id="program" >Program</th>
<th id="fiscal year 1999">FY 1999</th>
<th id="fiscal year 2000">FY 2000</th>
</tr>
```

```
<tr>
<th id="quarter 1">Q1</th>
<th id="quarter 2">Q2</th>
<th id="quarter 3">Q3</th>
<th id="quarter 4">Q4</th>
<th id="quarter 1">Q1</th>
<th id="quarter 2">Q2</th>
<th id="quarter 3">Q3</th>
<th id="quarter 4">Q4</th>
</tr>
```

```
<tr>
<td header="program">BIO</td>
<td headers="fiscal year 1999, quarter 1"> 10</td>
<td headers="fiscal year 1999, quarter 2">
25</td>
<td headers="fiscal year 1999, quarter 3">
5</td>
<td headers="fiscal year 1999, quarter 4">
30</td>
<td headers="fiscal year 2000, quarter 1">
12</td>
```

```
<td headers="fiscal year 2000, quarter 2">
26</td>
<td headers="fiscal year 2000, quarter 3">
6</td>
<td headers="fiscal year 2000, quarter 4">
31</td>
</tr>
```

ETC...

**\*NOTE: Elaborate, computer-generated or spreadsheet tables of data may be able to fulfill this requirement by doing both of the following:**

1. A paragraph describing the content of the table should accompany the actual data.
2. Create a link to the actual data file (i.e., download the following table in MS Excel '97 format).
3. Each page containing the complex data table should contain contact information for users to receive the data tables in an alternative format (i.e., please contact John Doe at 555-1212 if you need the data table in an alternative format).

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<sup>1</sup> The content for this portion of the [NSF Web Development Policy & Standards Manual](#) has been modified from the [World Wide Web Consortium \(W3C\) Website](#).

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# Web Development Policy & Standards

## IV. Best Practices & Technical Requirements

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| [Example 15](#) | [Example 16](#) | [Example 17](#) | [Example 18](#)

---

#### Tables

##### EXAMPLE

16.

**Tables should not be used solely for layout unless the table transforms gracefully when linearized. If the table does not make sense when linearized, an alternative must be provided. ([W3C](#))**

If it is necessary to use a table for layout, the table must make sense when linearized. When a table is linearized, the contents of the cells become a series of paragraphs (e.g., down the page), one after another. Cells should make sense when read in order (row-wise or column-wise) and should include structural elements (that create paragraphs, headers, lists, etc.) so the page makes sense after linearization. **DO NOT USE** table markup designed for data tables when using tables for layout.

Please check your pages through [Betsie](#) (a text parser) to see if any adjustments may be needed.

**It is important to note** that screen readers read tables from left to right one cell at a time. Therefore, adjust web pages so the page makes sense when read this way.

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**NSF WDPS | Introduction | Policy | Procedures | Best Practices & Technical Requirements**



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# IV. Best Practices & Technical Requirements

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| [Example 15](#) | [Example 16](#) | [Example 17](#) | [Example 18](#)

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### Time-sensitive Content Changes

#### EXAMPLE

17. Do not enable the screen to flicker (do not use <MARQUEE>).

**Do not enable the screen to blink (do not use <BLINK>). ([W3C](#))**

Some people with cognitive or visual disabilities are unable to read moving text quickly enough or at all. Movement can also cause such a distraction that the rest of the page becomes unreadable for people with cognitive disabilities. Screen readers are unable to read moving text. People with physical disabilities might not be able to move quickly or accurately enough to interact with moving objects.

Note: People with photosensitive epilepsy can have seizures triggered by flickering or flashing in the 4 to 59 flashes per second (Hertz) range with a peak sensitivity at 20 flashes per second as well as quick changes from dark to light (like strobe lights).



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---

### Time-sensitive Content Changes

#### EXAMPLE

18.

**When a timed response is required, the user will be alerted and given sufficient time to indicate more time is required.**

A disability can have a direct impact on the speed with which a person can read, move around, or fill out a web form. For this reason, when a timed response is required, the user must be alerted and given sufficient time to indicate that additional time is necessary.

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### IV. 1. Required Practices

#### C. Checklists

Please select from the following checklists:

1. [Required Web Practices Checklist](#)
2. [Required Web Accessibility Practices Checklist](#)



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# Web Development Policy & Standards

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### IV.1. Required Practices

#### C.1. Required Web Practices Checklist

##### NSF Site Identification

External NSF web pages:

- Yes Document includes NSF logo  
 No\*

- Yes Document includes NSF Identification  
 No\*

- Yes Document title includes "NSF"  
 No\*

- Yes Document contains a link to the NSF home page  
 No\*

- Yes Document contains a link to the Division or Directorate home page  
 No\*

##### Required Tags and Page Layout

- Yes DOCTYPE is stated  
 No\*

- Yes <HTML> <HEAD> <TITLE> <BODY> tags present  
 No\*

- Yes Start page title includes NSF  
 No\*

- Yes Email link to webmaster and contact information is provided  
 No\*

- Yes      Last modified date provided  
 No\*  
  
 Yes      If frames are used, NOFRAMES option present  
 N/A  
  
 Yes      Author, file creation and expiration date included in header or comments  
 No\*  
  
 Yes      Only HTML 4 tags used  
 No\*

### File Names

- Yes      "Spaces" in filenames are represented by underscore or dash  
 N/A  
  
 Yes      No non-alphanumeric or punctuation characters are used.  
 No\*  
  
 Yes      File extensions include only allowed content types.  
 No\*  
  
 Yes      Graphic images use .gif and/or .jpg  
 N/A  
  
 Yes      File names are short and use document number when appropriate  
 No\*  
  
 Yes      HTML files have the extention .htm or .html  
 No\*  
  
 Yes      HTML file links have been verified  
 No\*  
  
 Yes      Multipage document first page is titled start.html or index.html  
 No\*

### PDF Standards

- Yes      [Optimizing Adobe PDF Files for Accessibility](#) was followed when creating PDF file.  
 N/A\*  
  
 Yes      Is the file size of your PDF file indicated?  
 N/A\*  
  
 Yes      Does the PDF file have bookmarks?  
 N/A\*

- Yes If the PDF file size is larger than 150 Kb has the file been broken down into smaller pieces?
- Yes Are links to tables and graphs in Excel format and/or contact information provided?
- Yes Has the "Document Info/Open" been changed to "Bookmarks and Page"?
- Yes Has the "Document Info/Open" magnification option been changed to "Fit Width"?
- Yes Does the Title field in the "Document Info/General" dialogue box contain the title of the publication, followed, in parentheses, by the NSF publication number?
- Yes Does the Author field contain the authors name and the directorate/division.

### Page/Content Considerations

- Yes Document uses [plain language](#)
- No\*
- Yes Document includes [privacy statement](#) when collecting personal data
- N/A
- Yes Document has appropriate NSF clearance (if needed) (see Policy section [II.1.A. Author Responsibility](#))
- N/A
- Yes Document validates to stated DOCTYPE
- No\*

### Style Considerations

- Yes Document has logical HTML structure
- No\*
- Yes Document uses stylesheets and does not include any <FONT> tags
- No\*
- Yes Mixed cases are used for titles and text
- No\*

- Yes Dark text is used on a light background  
 No\*
- Yes Moderate font sizes are used for large sections of text (no smaller than small or 60%)  
 No\*
- Yes Style sheets specify font sized in relative measurements  
 N/A
- Yes Document does not use the <blink> or <marquee> tags (see Best Practices & Technical Resources section [IV.1.B. Required Practices - Web Accessibility](#))  
 No\*
- Yes HTML generated from Microsoft 2000 programs exported setting to "Cross Browser"  
 No\*

### Code Level/Browser Considerations

- Yes Document validates as correct HTML  
 No\*
- Yes HTML comments are used to annotate complicated layouts  
 N/A\*
- Yes Documents degrade gracefully to Netscape and IE 3 and above  
 No\*
- Yes Alternative, non-windows fonts are provided  
 No\*
- Yes Javascript navigation widgets provide non-Javascript alternatives  
 N/A
- Yes Document includes alternative methods for users to obtain the same information when Java applets are used  
 N/A
- Yes Documents using cookies warn the user and allow them to decline the cookie  
 N/A
- Yes Javascript using the browser status bar does not include ticker or other information  
 N/A
- Yes Links to start pages are at the directory level  
 N/A

### Graphic Considerations

- Yes      Graphics were created using a [web safe palette](#) and saved in the minimum number of colors needed  
 N/A
- Yes      GIFs are used for line art and simple pictures  
 N/A
- Yes      JPEGs are used for photos and complex pictures  
 N/A
- Yes      Images are displayed at actual size  
 N/A
- Yes      Background graphics are used sparingly  
 N/A
- Yes      Images use height and width tags  
 N/A
- Yes      Images include alt tags for meaningful images  
 N/A
- Yes      Copyrighted images have permission  
 N/A
- Yes      Document does not include clipart and/or unnecessary animated images  
 N/A

### Form Considerations

- Yes      Form data has been validated  
 N/A
- Yes      Formal clearance has been given (see Policy section [II.1.A. Author Responsibility](#))  
 N/A
- Yes      Form pages include email address, telephone, and/or fax number  
 N/A

\* Please provide detailed information for all NO answers.

Questions or Comments [webhelp@nsf.gov](mailto:webhelp@nsf.gov)



# Web Development Policy & Standards

## IV. Best Practices & Technical Requirements

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### IV. 1. Required Practices

#### C.2. Required Web Accessibility Practices Checklist

##### Auditory, Visual, and Multimedia Content

Yes: N/A: 1. Do all significant or meaningful non-text items have a meaningful "alt" text equivalent?

Yes: N/A: 2. A. Do all client-side image maps have meaningful "alt" text associated with the appropriate links?

Yes: N/A: 2. B. Do all server-side image maps have redundant text links for each active region of the image map?

Yes: N/A: 3. Has captioning been provided for all audio tracks?

Yes: N/A: 4. Have equivalent alternatives for any multimedia presentation been synchronized with the presentation?

##### Color

Yes: N/A: 5. Are pages designed so all information required for navigation or meaning is not dependent on the ability to identify specific colors?

## Embedded Applications

- Yes:      N/A:
- 6. A. Are pages usable when scripts, applets, or other programmatic objects are turned off or not supported?
- Yes:      N/A:
- 6. B. If No, Is there an equivalent alternative accessible page?
- Yes:      N/A:
- 7. Are links provided for applets, plug-ins or other applications required to interpret pages?

## Frames

- Yes:      N/A:
- 8. Are all frames titled with frame identifications and navigation using the "title" and "name" attributes?

## Navigation

- Yes:      N/A:
- 9. Are targets of each link clearly identified?
- Yes:
- 10. Does each page have a unique and descriptive title included in the TITLE element?
- Yes:      N/A:
- 11. Do repetitive navigation links have a way to bypass that navigation?

## Cascading Style Sheets

- Yes:      N/A:
- 12. Are web pages organized so that they are readable without requiring an associated style sheet?

## Forms

Yes:      N/A:      13. A. Are electronic form pages labeled appropriately?  
(If yes, go to question 13 B.)

Yes:      N/A:      13. B. Is contact information included on all electronic  
form pages?

## Tables

Yes:      N/A:      14. Do data tables have identification of row and  
column headers?

Yes:      N/A:      15. In tables with two or more logical levels of row or  
column headers, was markup used to associate  
data cells and header cells?

Yes:      N/A:      16. Do tables used for layout transform gracefully when  
linearized?

## Time-sensitive Content Changes

No:      17. Do your pages enable the screen to flicker or blink  
(<marquee> or <blink>)?

Yes:      N/A:      18. Do timed responses alert the user and give  
sufficient time to indicate more time is required?

If you cannot use or send this form, please contact the webteam at 703-292-8129 or at [webteam@nsf.gov](mailto:webteam@nsf.gov).



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## IV. 2. Recommended Practices

### A. Web

#### Text Elements

- Paragraphs should be aligned to the left rather than centered.
- Centered text should be reserved for headings and other brief lines of text.
- Avoid bolding or italicizing paragraphs. These attributes should be used for pull or block quotations when necessary.
- Keep lines of text short as long lines of text can be hard to read.

#### PDF & Multimedia File Formats

- Include file sizes for PDF and multimedia files linked to a page (see Resources section link to pdf).
- Clearly indicate the format of these files and link to the [NSF Plug-in and Viewer page](#) or include links to information about how to get the plug-ins required for viewing these files.



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# IV Best Practices & Technical Requirements

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## IV. 2. Recommended Practices<sup>1</sup>

### B. Web Accessibility

These guidelines were created to help NSF web developers practice accessible HTML. The following items are recommended but not required for all NSF developers.

#### Auditory, Visual, and Multimedia Content

1. Supplement text with graphic or auditory presentations when it will facilitate comprehension of the page.
2. Create a style of presentation that is consistent across pages.

#### Color

1. Foreground and background color combinations should provide sufficient contrast (images and text).

#### Markup and Style Sheets

1. Text markup should be used instead of images, where possible.
2. Documents should be created that validate to published formal HTML 4.0 specifications.
3. Stylesheets should be used when possible to control layout and presentation.
4. Relative rather than absolute units should be used when possible in markup language attribute values and style sheet property values.
5. Header elements should be used when possible to convey document structure and use them according to specification.

6. Use HTML markup for lists and list items properly.
7. Mark up quotations properly, not using <blockquote> markup for indentation or other formatting effects.

## Natural Language

1. Specify the expansion of each abbreviation or acronym where it first occurs in a document (using ABBR and ACRONYM).
2. Changes in the natural language of a document's text and any text equivalents should be clearly identified.
3. Identify the primary natural language of a document.

## Tables

1. If a table is used for layout, do not use any structural markup for the purpose of visual formatting.
2. Provide summaries for tables.
3. Provide abbreviations for header labels.

## New Technologies

1. For scripts and applets, ensure that event handlers are input device-independent.
2. Ensure that dynamic content is accessible or provide an alternative presentation or page.

## Time-sensitive Content

1. Avoid movement in pages.
2. Avoid creating automatically refreshing pages.
3. Markup redirecting pages can be used to allow the server to do the work, but a link should always be provided to redirect users.

## Device-independence

1. Create a logical tab order through links, form controls, and objects.

2. Provide keyboard shortcuts to important links, form controls, and groups of form controls.

## Interim Solutions

1. Use spawned windows only when necessary.
2. Ensure form control labels are properly positioned and labeled.
3. Include default, place-holding characters in edit boxes and text areas.
4. Include non-link, printable characters between links.
5. If an accessible page cannot be created, provide a link to an alternate accessible page (this is not highly recommended because content on both pages will need to be updated appropriately).

## Context and Orientation

1. It is strongly recommended that the <NOFRAMES> element is used in every page with a frameset.
2. Describe the purpose of frames and how they relate if it is not obvious by frame titles alone.
3. Divide large blocks of information into more manageable groups where natural and appropriate.
4. Associate labels explicitly with their controls.

## Navigation

1. Navigation mechanisms should be used in a consistent manner.
2. Provide metadata to add semantic information to pages and sites.
3. Provide navigation bars to highlight and give access to the navigation mechanism.
4. If search functions are provided, enable different types of searches for different skill levels and preferences.
5. Place appropriate coding information at the beginning of headings, paragraphs, lists, etc.
6. Provide information about document collections.

7. Provide means to skip over multi-line ASCII art.

<sup>1</sup> The content for this portion of the NSF Web Development Policy & Standards has been modified from the [World Wide Web Consortium \(W3C\) Website](#).

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### IV.3. [Security](#)

## IV. 3. Security

Maintaining the security of NSF web servers is the joint responsibility of all system administrators, developers, and content providers.

### **System Administrators:**

System administrators (for directorate servers as well as for central servers) are responsible for maintaining operating system and server software security.

### **Web Application Developers:**

Web Application developers are responsible for learning safe web programming practices and applying them. NSF contracting officer technical representatives (COTRs) are responsible for ensuring that contractors are trained in NSF-specific requirements.

### **Webmasters:**

Web page developers who have accounts on the central servers are responsible for choosing good passwords, keeping their passwords secure, and changing them if they have been compromised.

### **Specific Tips:**

- Don't use scripts or applications obtained from outside sources unless you understand everything they do and you have obtained permission to use them from the system administrator.
- Do not test scripts or applications on the production server.
- Don't install any scripts on the web server without the approval of the system administrator.
- Validate all data entered into forms.

- Do not embed passwords in templates, or store passwords in cleartext.
- Scripts or applications that allow users to upload files must prevent users from uploading executable files, or from uploading files out of the specified directory.
- Scripts or applications that send email must not allow users to specify the "TO" or "FROM" address.

## Security Resources:

### Security Mailing Lists

- NTBugtraq (<http://www.ntbugtraq.com>) NT issues
- Bugtraq (Unix and NT) (<http://www.securityfocus.com>)

### Web Sites

- Microsoft Security checklist (<http://www.microsoft.com/technet/security/iischk.asp>)
- [Macromedia Security Zone](#)
- [Cold Fusion Coding Tips and Security Advice](#)
- Computer Security Info (NIH) (<http://www.alw.nih.gov/Security/security.html>)
- CERT (<http://www.cert.org>)
- CIAC (<http://www.ciac.org/>)

### Reference Materials at NSF

- CIAC Web Security Bulletin (<http://ciac.llnl.gov/ciac/bulletins/j-042.shtml>)
- Security Information for System Administrators (<http://www.inside.nsf.gov/oirm/dis/web/geninfo/security.htm>)
- Writing Perl CGI Programs for Central Web Servers (<http://www.inside.nsf.gov/oirm/dis/web/howto/perlcgi.htm>)

### Who's Been Hacked?

- Hacker News Network (<http://www.hackernews.com/archive/crackarch.html>)

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# Web Development Policy & Standards

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### IV. Best Practices

#### & Technical Requirements

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##### IV.2. Recommended Practices

###### IV.2.A. Web

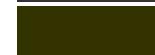
###### IV.2.B. Web Accessibility

##### IV.3. Security

	Hex Code	Color	Hex Code	Color	Hex Code	Color
	#FFFFFF		#CCFFFF		#99FFFF	
IV.1. Required Practices	#FFFFCC		#CCFFCC		#99FFCC	
	#FFFF99		#CCFF99		#99FF99	
	#FFFF66		#CCFF66		#99FF66	
	#FFFF33		#CCFF33		#99FF33	
	#FFFF00		#CCFF00		#99FF00	
IV.1.A. Web	#FFCCFF		#CCCCFF		#99CCFF	
IV.1.B. Web Accessibility	#FFCCCC		#CCCCCC		#99CCCC	
	#FFCC99		#CCCC99		#99CC99	
IV.1.C. Checklists	#FFCC66		#CCCC66		#99CC66	
	#FFCC33		#CCCC33		#99CC33	
	#FFCC00		#CCCC00		#99CC00	
IV.2. Recommended Practices	#FF99FF		#CC99FF		#9999FF	
	#FF99CC		#CC99CC		#9999CC	
	#FF9999		#CC9999		#999999	
	#FF9966		#CC9966		#999966	
	#FF9933		#CC9933		#999933	
	#FF9900		#CC9900		#999900	
	#FF66FF		#CC66FF		#9966FF	
	#FF66CC		#CC66CC		#9966CC	
	#FF6699		#CC6699		#996699	
	#FF6666		#CC6666		#996666	
	#FF6633		#CC6633		#996633	
	#FF6600		#CC6600		#996600	
	#FF33FF		#CC33FF		#9933FF	
	#FF33CC		#CC33CC		#9933CC	

#FF3399		#CC3399		#993399	
#FF3366		#CC3366		#993366	
#FF3333		#CC3333		#993333	
#FF3300		#CC3300		#993300	
#FF00FF		#CC00FF		#9900FF	
#FF00CC		#CC00CC		#9900CC	
#FF0099		#CC0099		#990099	
#FF0066		#CC0066		#990066	
#FF0033		#CC0033		#990033	
#FF0000		#CC0000		#990000	

Hex Code	Color	Hex Code	Color	Hex Code	Color
#66FFFF		#33FFFF		#00FFFF	
#66FFCC		#33FFCC		#00FFCC	
#66FF99		#33FF99		#00FF99	
#66FF66		#33FF66		#00FF66	
#66FF33		#33FF33		#00FF33	
#66FF00		#33FF00		#00FF00	
#66CCFF		#33CCFF		#00CCFF	
#66CCCC		#33CCCC		#00CCCC	
#66CC99		#33CC99		#00CC99	
#66CC66		#33CC66		#00CC66	
#66CC33		#33CC33		#00CC33	
#66CC00		#33CC00		#00CC00	
#6699FF		#3399FF		#0099FF	
#6699CC		#3399CC		#0099CC	
#669999		#339999		#009999	
#669966		#339966		#009966	
#669933		#339933		#009933	
#669900		#339900		#009900	
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#666699		#336699		#006699	
#666666		#336666		#006666	

#666633		#336633		#006633	
#666600		#336600		#006600	
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#6633CC		#3333CC		#0033CC	
#663399		#333399		#003399	
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#663333		#333333		#003333	
#663300		#333300		#003300	
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#660033		#330033		#000033	
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